

Interactive Systems (CSE573)
Professor Pushpendra Singh

Submitted By: Rahul Oberoi (2021555)

Introduction

AI integration in user-facing systems is becoming increasingly common, as explored in the paper "Guidelines for Human-AI Interaction". This presents both opportunities and challenges. While AI can enhance functionalities like speech recognition and object recognition, the uncertainty that it presents can lead to unpredictable and error-prone behaviour. This can be confusing and frustrating for users, primarily when AI actively filters content or takes actions on their behalf.

These inconsistencies can violate established usability guidelines, specifically the principles of consistency and error prevention. Traditional HCI principles may not be sufficient for designing effective AI-infused systems. There is a need for new guidelines that can be adapted and improved upon as AI technology advances.

What are the challenges that the paper is solving?

The scope of this research lies in the betterment of AI systems (those that currently in use and those of the future that may be developed). According to their viewpoint authors proposed 18 guidelines that help solve the challenges of probabilistic AI which can be confusing to the user.

Research methods and methodology used

Phase-1

To understand the best practices for human-centred AI design, the authors' research approach consisted of the following elements:

- They gathered AI design guidelines from two sources: internal company documents and publicly available external resources. They then categorised them based on recurring themes. Additionally, they selected samples of AI products, both internally developed and from external sources, and evaluated them against the identified themes from the collected guidelines.
- They analysed internal customer feedback on their company's AI products, including reviews and bug reports. This provided valuable insights into real-world user experiences.

- They complemented their findings with recent industry publications and editorials on AI design, along with a review of relevant academic research in this field.

After this 3 researchers classified the concepts into 35 clusters using affinity mapping, however, they were reduced to 20 after filtration (removed clusters that were too vague or too niche).

Phase-2

The initial research yielded 20 guidelines. To ensure the guidelines were clear, easy to understand, and avoided redundancy, the researchers consolidated overlapping concepts. This resulted in a streamlined set of 18 guidelines.

Phase-3

To assess the guidelines' effectiveness (applicability and clarity), researchers conducted a user study with 49 HCI professionals. Participants evaluated the guidelines against various AI-powered products, using a 5-point scale ("clearly violated" to "clearly applied") and providing explanations for their ratings. Additionally, participants were incentivised to include screenshots for illustrative purposes.

After looking at the results of this study, the guidelines were revised and improved for clarity.

Phase-4

To assess clarity and usability, 11 HCI/UX professionals (designers, researchers, and product planners) reviewed the revised guidelines. They compared original and revised versions, evaluated confusing guideline pairs, and rated difficulty in distinguishing similar pairs.

Revisions improved clarity for most guidelines, but some experts found Guidelines 1 and 2 still needed refinement

Main results

1. Across 20 products evaluated, participants identified 785 examples (applications, violations, neutrals, "does not apply") of the 18 AI design guidelines, suggesting the guidelines are broadly relevant. Some guidelines like 1, 4, 12 had significantly more applications than violations, indicating they are widely implemented. Others like 2, 11, 17 had more violations than applications, suggesting room for improvement in implementation.
2. Guidelines 5 (match social norms) and 6 (mitigate biases) were rated as least clear by participants. The authors revised the phrasing of several guidelines to improve clarity based on participant feedback and misinterpretations.

3. Common mechanisms like frequent item sets, location, user history were used to implement guidelines like showing contextual information (4) and maintaining working memory (12). Guidelines on explanations (11) and mitigating biases (6) had high violations, suggesting more work is needed.
4. Voice assistants had the most "does not apply" ratings. Guidelines 10 (scope services when in doubt) and 14 (update and adapt cautiously) were hard to observe in single product use sessions. Diverse evaluators and training may be needed to better recognize violations related to social norms and biases.

In summary, the evaluation provided evidence of the guidelines' relevance across products, identified strengths and areas for improvement in implementation, revised wording for clarity, and discussed implementation mechanisms and product-specific observations.

Critique

- The study included 49 HCI professionals, all participants were from a single company. However, I believe that including participants from diverse companies and backgrounds could provide a broader perspective on the applicability of the guidelines. The authors acknowledge this limitation, stating "These assessments suggest that a diverse set of evaluators may be necessary to effectively recognize or apply these guidelines in practice."
- Additionally, the evaluation relied only on HCI professionals. Future research could benefit from incorporating usability testing with non-HCI participants, as they would be the target users of these AI systems. Their insights would be invaluable in understanding user confusion and the effectiveness of the guidelines in real-world scenarios.
- The applicability of the guidelines to AI systems without graphical interfaces (e.g., voice assistants) requires further investigation. Tailoring guidelines for different interface types may be necessary, but this could lead to redundancy and complexity. Exploring methods for creating adaptable guidelines that can be applied across various interfaces would be a valuable next step.

Conclusion

The paper presents a comprehensive effort to develop and validate a set of 18 design guidelines for creating effective human-AI interaction in user-facing systems. The authors followed an iterative process, refining the guidelines based on feedback from multiple rounds of evaluation with HCI professionals.

The main results suggest that the proposed guidelines are broadly relevant across various product categories and provide insights into their current implementation status. While some guidelines are widely implemented, others need further work, particularly in areas like providing explanations and mitigating biases.

Nevertheless, the research has drawbacks of a limited participant pool. Integrating end-users and users of the guidelines into the research would provide great insights. On top of that, changing the rules towards a variety of interfaces, like voice assistants, poses an even more difficult problem to address.

Overall, it lays a foundation for designing user-centred AI-infused systems, and the authors acknowledge the need for continued research and refinement as AI technology evolves.

Tools and References

1. Saleema Amershi, Dan Weld, Mihaela Vorvoreanu, Adam Fourney, Besmira Nushi, Penny Collisson, Jina Suh, Shamsi Iqbal, Paul N. Bennett, Kori Inkpen, Jaime Teevan, Ruth Kikin-Gil, and Eric Horvitz. 2019. Guidelines for Human-AI Interaction. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19). Association for Computing Machinery, New York, NY, USA, Paper 3, 1–13. <https://doi.org/10.1145/3290605.3300233>
2. Grammarly for fixing grammatical errors